1. Write down the next five terms of the following sequences.

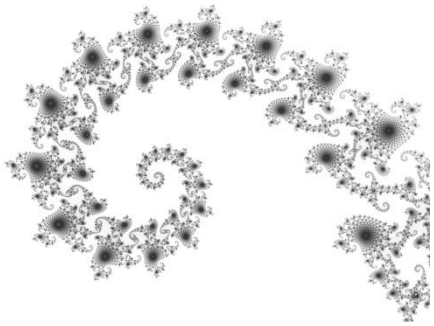
a. $x_{n+1} = x_n + 2$ and $x_1 = 3$

b. $x_{n+1} = 3n_x - 1$ and $x_1 = 2$

c. $x_{n+1} = 2x_n - 1$ and $x_1 = \frac{1}{2}$

d. $x_{n+1} = x_{n^2}$ and $x_1 = 2$

e. $x_{n+1} = 5x_n - 3$ and $x_1 = 0.25$



2. A sequence is defined by the term-to-term rule $u_{n+1} = u_n^2 - 3u_n$ Given that $u_1=2$, find u_2, u_3 and u_4.

3. A sequence is defined by the rule $u_{n+1} = \frac{x_n - 1}{3x_n + 1}$. Given that $x_1=3$, find x_2, x_3 and x_4.

4. A population of ostriches is expected to grow by 7% each year for the next five years. The iteration $x_{n+1} = 1.07\ x_n$ is used to work out the number of ostriches each year and $x_0 = 560$.

a. What does x_0 mean in this context?

b. Use the iteration to work out the number of ostriches in five years' time.

5. It has been predicted that profits of a small business will decline at a rate of 2.5% each year for the next 8 years.

a. The iteration formula to show this is $x_{n+1} = 0.975x_n$. Can you explain why?

b. Use the iteration $x_{n+1} = 0.975x_n$ to find the profit in four years' time when the current profit is £1500. Give your answer to the nearest penny

6. Below shows the development of a shape called the "Koch Snowflake". How do you think this demonstrates an iterative process?

1st 2nd 3rd 4th

7. $x_{n+1} = 3 + \frac{2}{x_n{}^2}$. If $x_1=1$ to find a solution to $x_{n+1} = 3 + \frac{2}{x_n{}^2}$ to 1 decimal place.

Answers

1.

a. 5,7,9,11,13

b. 5,14,41,122,365

c. 0,-1,-3,-7,-15

d. 4, 16, 256, 65 536, 4 294 967 296

e. -1.75, -11.75, -61.75, -311.75, -1 561.75

2.

-2, 10, 70

3.

0.2, -0.5, 3

4.

a. x_0 represents the number of students before any time has passed

b. 785

5.

a. 2.5% decrease leaves 97.5%, this is 0.975 as a decimal multiplier

b. 1355.53

6.

Each iteration of the snowflake adds an extra triangle in the middle of each straight edge.

7.

3.2 1dp